

2-2 Logic Continued
Venn Diagrams

Venn Diagrams

\wedge -- AND
 \vee -- OR Union (all)

(common) Intersection

$p \wedge q$ $p \vee q$ $\sim p \wedge q$ $\sim p \vee q$

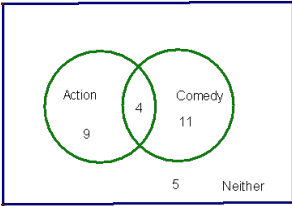
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Use the Venn diagram to answer the following questions.

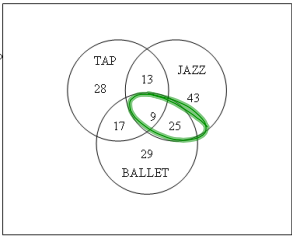
Jack surveyed the students in his science class to find out what movies they preferred.

- 1. 29 How many students were surveyed?
 $9+4+11+5$
- 2. 13 How many students preferred Action?
 $9+4$
- 3. 4 How many students preferred Action and Comedy?
 4
- 4. 14 How many students did not prefer comedy?
 $9+5$



Use the following Venn diagram about dance classes to answer the questions.

- 1. 9 How many students are in tap, jazz, and ballet?
- 2. 121 How many are in tap or ballet?
- 3. 25 How many are in jazz and ballet and not tap?
- 4. 34 How many are in jazz and ballet?

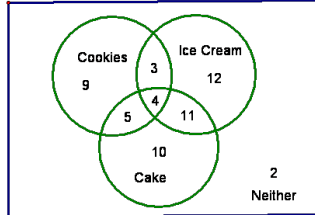


$28, 13, 9, 17, 25, 29$

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Use the following Venn diagram about dessert preferences to answer the questions.



1. 54 How many people were surveyed?
2. 21 How many people preferred cookies?
 $9+5+4+3$
3. 9 How many people preferred cookies and cake?
 $5+4$
4. 26 How many people did not prefer ice cream?
 $9+5+10+2$
5. 45 How many people preferred cake or ice cream?
 $5+4+11+10+3+12$
6. 4 How many people preferred cookies and cake and ice cream?

2-3 Conditional Statements

Conditional statements are statements written in the *if, then* form.

If p , then q . p -hypothesis q -conclusion

$p \rightarrow q$ "if p , then q " or " p implies q "

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Examples:

If Cinderella completes her chores, then she can go to the ball.

If an angle is a right angle, then it measures 90° .

If a polygon has exactly 6 sides, then it is a hexagon.

Examples:

All squares are rectangles.

If X is a square, then X is a rectangle.

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All cats are animals.

If X is a cat, then
X is an animal

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Related conditionals

Conditional	$p \rightarrow q$	
Converse	$q \rightarrow p$	\rightarrow switching p + q
Inverse	$\sim p \rightarrow \sim q$	\rightarrow negates original
Contrapositive	$\sim q \rightarrow \sim p$	\rightarrow negates converse

If a conditional is true, then the contrapositive must also be true. They are said to be logically equivalent. The same is true for the converse and the inverse.

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Example: Put the following statement into the if, then form. Write each related conditional. Determine whether it is True or False. If false, provide a counterexample.

Example:

All birds are owls.

Conditional:

If X is a bird, then X is an owl. (F)
(T) (parrot)

Converse:

If X is an owl, then X is a bird. (T)

Inverse:

If X is not a bird, then X is not an owl. (T)

Contrapositive:

If X is not an owl, then X is not a bird. (F) (parrot)

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Example: Write each related conditional. Determine whether it is True or False. If false, provide a counterexample.

If two angles form a linear pair, then they are adjacent angles. (T)

Converse: If 2 \angle s are adj. \angle s, then they form a linear pair. (F)

Inverse: If 2 \angle s are not adj. \angle s, then they are not adj. \angle s. (F)

Contrapositive: If 2 \angle s are not adj. \angle s, then they do not form a L.P. (T)

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Assignment: p. 72-73 #s 15-17, 41-47, 51
p. 78-79 #s 16, 17, 23, 25, 26, 34-39, 43

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Assignment: p. 72-73 #s 15-17, 41-47, 51
p. 783 #s 3-5

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